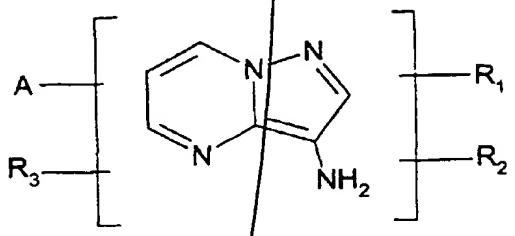
CLAIMS

1. Compounds of formula (I) below, and their addition salts with an acid:



(I)

in which:

- R_1, R_2 and R_3, which may be identical or different, represent a hydrogen atom; a halogen atom; a group Z; a (C_1-C_6 alkyl)carbonyl radical; an amino(C_1-C_6 alkyl)carbonyl radical; an N-Z-amino(C_1-C_6 alkyl)carbonyl radical; an N-(C_1-C_6 alkyl)amino(C_1-C_6 alkyl)carbonyl radical; an N,N-di(C_1-C_6 alkyl)amino(C_1-C_6 alkyl)carbonyl radical; an amino(C_1-C_6 alkyl)carbonyl(C_1-C_6 alkyl) radical; an N-Z-amino(C_1-C_6 alkyl)carbonyl(C_1-C_6 alkyl) radical; an N-(C_1-C_6 alkyl)amino(C_1-C_6 alkyl)carbonyl(C_1-C_6 alkyl) radical; an N,N-di(C_1-C_6 alkyl)amino(C_1-C_6 alkyl)carbonyl(C_1-C_6 alkyl) radical; a carboxyl radical; a (C_1-C_6 alkyl)carboxyl radical; a (C_1-C_6 alkyl)sulphonyl radical; an aminosulphonyl radical; an N-Z-aminosulphonyl radical; an N-(C_1-C_6 alkyl)aminosulphonyl radical; an N,N-di(C_1-C_6 alkyl)-aminosulphonyl radical; an aminosulphonyl(C_1-C_6 alkyl) radical; an N-Z-aminosulphonyl(C_1-C_6 alkyl) radical; an N-(C_1-C_6 alkyl)aminosulphonyl(C_1-C_6 alkyl) radical;

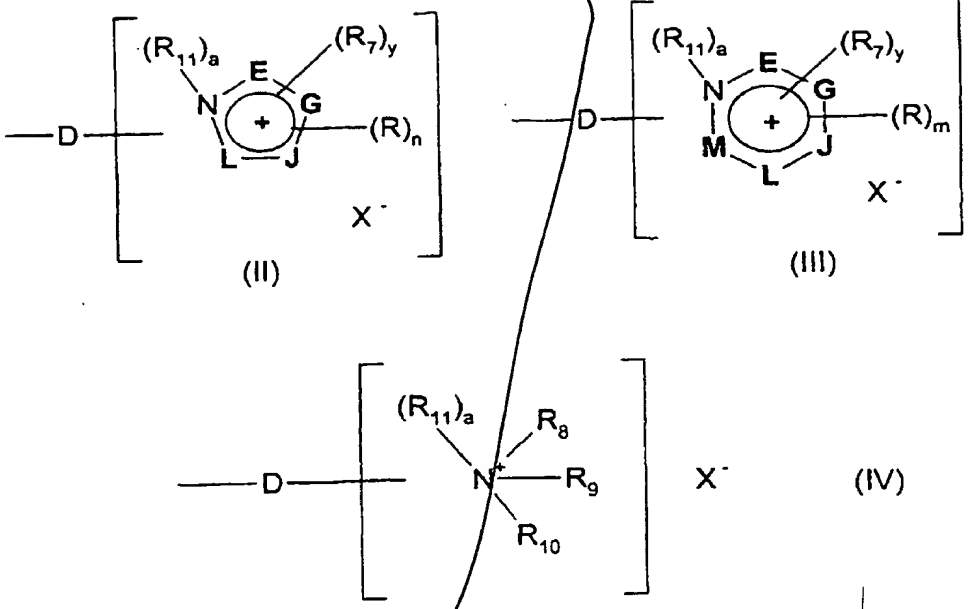
an N,N-di(C_1-C_6 alkyl)aminosulphonyl(C_1-C_6 alkyl) radical; a carbamyl radical; an N-(C_1-C_6 alkyl)carbamyl radical; an N,N-di(C_1-C_6 alkyl)carbamyl radical; a carbamyl(C_1-C_6 alkyl) radical; an N-(C_1-C_6 alkyl)carbamyl(C_1-C_6 alkyl) radical; an N,N-di(C_1-C_6 alkyl)carbamyl(C_1-C_6 alkyl) radical; a C_1-C_6 alkyl radical; a hydroxyl radical; a nitro radical; a C_1-C_6 monohydroxyalkyl radical; a C_2-C_6 polyhydroxyalkyl radical; a C_1-C_6 (C_1-C_6 alkoxy)alkyl radical; a C_1-C_6 trifluoroalkyl radical; a cyano radical; a group OR_6 or SR_6; an amino radical; an N-(C_1-C_6 alkyl)amino radical; an N,N-di(C_1-C_6 alkyl)amino radical (where the two alkyl substituents may form a 5- or 6-membered ring); an N-hydroxy(C_1-C_6 alkyl)amino radical; an N,N-bis(hydroxy(C_1-C_6 alkyl))amino radical; an N-polyhydroxy(C_2-C_6 alkyl)amino radical; an N,N-bis(polyhydroxy(C_2-C_6 alkyl))amino radical; an amino(C_1-C_6 alkyl)amino radical in which the terminal amino group is unsubstituted or substituted by one or two C_1-C_6 alkyl radicals, where the said alkyl radicals may form a saturated or unsaturated, 5- or 6-membered ring; an amino group protected by a (C_1-C_6 alkyl)carbonyl, trifluoro(C_1-C_6 alkyl)carbonyl, amino(C_1-C_6 alkyl)carbonyl, N-Z-amino(C_1-C_6 alkyl)-carbonyl, N-(C_1-C_6 alkyl)amino(C_1-C_6 alkyl)carbonyl, N,N-di(C_1-C_6 alkyl)amino(C_1-C_6 alkyl)carbonyl or formyl radical or by a group Z;

- R_6 denotes a C_1-C_6 alkyl radical; a C_1-C_6 monohydroxyalkyl radical; a C_2-C_6 polyhydroxyalkyl radical; a group Z; a C_1-C_6 (C_1-C_6 alkoxy)alkyl radical; an aryl radical; a benzyl radical; a C_1-C_6 carboxyalkyl radical; a C_1-C_6 (C_1-C_6 alkyl)carboxyalkyl radical; a C_1-C_6 cyanoalkyl radical; a C_1-C_6 carbamylalkyl radical; a C_1-C_6 N-(C_1-C_6 alkyl)carbamylalkyl radical; a C_1-C_6 N,N-di(C_1-C_6 alkyl)carbamylalkyl radical; a C_1-C_6 trifluoroalkyl radical; a C_1-C_6 aminosulphonylalkyl radical; a C_1-C_6 N-Z-aminosulphonylalkyl radical; a C_1-C_6 N-(C_1-C_6 alkyl)aminosulphonylalkyl radical; a C_1-C_6 N,N-di(C_1-C_6 alkyl)aminosulphonylalkyl radical; a C_1-C_6 (C_1-C_6 alkyl)sulphinylalkyl radical; a C_1-C_6 (C_1-C_6 alkyl)sulphonylalkyl radical; a C_1-C_6 (C_1-C_6 alkyl)carbonylalkyl radical; a C_1-C_6 aminoalkyl radical; a C_1-C_6 aminoalkyl radical whose amine is substituted by one or two identical or different radicals selected from C_1-C_6 alkyl, monohydroxy(C_1-C_6 alkyl), polyhydroxy(C_2-C_6 alkyl), (C_1-C_6 alkyl)-carbonyl, formyl, trifluoro(C_1-C_6 alkyl)carbonyl and (C_1-C_6 alkyl)sulphonyl radicals or by a group Z;
- A represents a group $-NR_4R_5$ or a hydroxyl radical;
- R_4 and R_5, which are identical or different, represent a hydrogen atom; a group Z; a C_1-C_6 alkyl radical; a C_1-C_6 monohydroxyalkyl radical; a C_2-C_6 polyhydroxyalkyl radical; a C_1-C_6 (C_1-C_6 alkoxy)alkyl radical; an aryl radical; a benzyl radical; a C_1-C_6

cyanoalkyl radical; a C_1-C_6 carbamylalkyl radical; a C_1-C_6 N-(C_1-C_6 alkyl)carbamylalkyl radical; a C_1-C_6 N,N-di(C_1-C_6 alkyl)carbamylalkyl radical; a C_1-C_6 thiocarbamylalkyl radical; a C_1-C_6 trifluoroalkyl radical; a C_1-C_6 sulphoalkyl radical; a C_1-C_6 (C_1-C_6 alkyl)carboxyalkyl radical; a C_1-C_6 (C_1-C_6 alkyl)sulphinylalkyl radical; a C_1-C_6 aminosulphonylalkyl radical; a C_1-C_6 N-Z-aminosulphonylalkyl radical; a C_1-C_6 N-(C_1-C_6 alkyl)-aminosulphonylalkyl radical; a C_1-C_6 N,N-di(C_1-C_6 alkyl)aminosulphonylalkyl radical; a C_1-C_6 (C_1-C_6 alkyl)carbonylalkyl radical; a C_1-C_6 aminoalkyl radical; a C_1-C_6 aminoalkyl radical whose amine is substituted by one or two identical or different radicals selected from C_1-C_6 alkyl, C_1-C_6 monohydroxyalkyl, C_2-C_6 polyhydroxyalkyl, (C_1-C_6 alkyl)carbonyl, (C_1-C_6 alkyl)sulphonyl, formyl and trifluoro(C_1-C_6 alkyl)carbonyl radicals or by a group Z;

one and only one of the radicals R_4 and R_5 may also represent a (C_1-C_6 alkyl)carbonyl; formyl; trifluoro(C_1-C_6 alkyl)carbonyl; amino(C_1-C_6 alkyl)carbonyl, N-Z-amino(C_1-C_6 alkyl)carbonyl; N-(C_1-C_6 alkyl)amino(C_1-C_6 alkyl)carbonyl; or N,N-di(C_1-C_6 alkyl)amino(C_1-C_6 alkyl)carbonyl radical;

- Z is selected from the unsaturated cationic groups of formulae (II) and (III) below and the saturated cationic groups of formula (IV) below:



(II) (III) (IV)

in which:

- D is a linker which represents an alkyl chain containing preferably 1 to 14 carbon atoms, is linear or branched and may be interrupted by one or more heteroatoms such as oxygen, sulphur or nitrogen atoms and may be substituted by one or more hydroxyl or C_1-C_6 alkoxy radicals, and may carry one or more ketone functions;
- the ring members E, G, J, L and M, which are identical or different, represent a carbon, oxygen, sulphur or nitrogen atom;
- n is an integer between 0 and 4, inclusively;
- m is an integer between 0 and 5, inclusively;
- the radicals R, which are identical or different, represent a group Z, a halogen atom, a hydroxyl radical, a C_1-C_6 alkyl radical, a C_1-C_6 monohydroxyalkyl radical, a C_2-C_6 polyhydroxyalkyl

radical, a nitro radical, a cyano radical, a C_1-C_6 cyanoalkyl radical, a C_1-C_6 alkoxy radical, a C_1-C_6 tri(C_1-C_6 alkyl)silanealkyl radical, an amido radical, an aldehydo radical, a carboxyl radical, a C_1-C_6 alkylcarbonyl radical, a thio radical, a C_1-C_6 thioalkyl radical, a (C_1-C_6 alkyl)thio radical, an amino radical, an amino radical protected by a (C_1-C_6 alkyl)carbonyl, carbamyl or (C_1-C_6 alkyl)sulphonyl radical; a group NHR" or NR"R"' in which R" and R"', which are identical or different, represent a C_1-C_6 alkyl radical, a C_1-C_6 monohydroxyalkyl radical or a C_2-C_6 polyhydroxyalkyl radical;

- R_7 represents a C_1-C_6 alkyl radical, a C_1-C_6 monohydroxyalkyl radical, a C_2-C_6 polyhydroxyalkyl radical, a C_1-C_6 cyanoalkyl radical, a C_1-C_6 tri(C_1-C_6 alkyl)silanealkyl radical, a C_1-C_6 (C_1-C_6 alkoxy)alkyl radical, a carbamyl(C_1-C_6 alkyl) radical, a C_1-C_6 (C_1-C_6 alkyl)carboxyalkyl radical, a benzyl radical, or a group Z;
- R_8, R_9 and R_{10}, which are identical or different, represent a C_1-C_6 alkyl radical, a C_1-C_6 monohydroxyalkyl radical, a C_2-C_6 polyhydroxyalkyl radical, a C_1-C_6 (C_1-C_6 alkoxy)alkyl radical, a C_1-C_6 cyanoalkyl radical, an aryl radical, a benzyl radical, a C_1-C_6 amidoalkyl radical, a C_1-C_6 tri(C_1-C_6 alkyl)silanealkyl radical or a C_1-C_6 aminoalkyl radical whose amine is protected by a (C_1-C_6 alkyl)carbonyl, amido, carboxyl or (C_1-C_6

alkyl)sulphonyl radical; two of the radicals R_8, R_9 and R_{10} may also form, together with the nitrogen atom to which they are attached, a saturated 5- or 6-membered carbon-containing ring or one containing one or more heteroatoms, it being possible for the said ring to be unsubstituted or substituted by a halogen atom, a hydroxyl radical, a C_1-C_6 alkyl radical, a C_1-C_6 monohydroxyalkyl radical, a C_2-C_6 polyhydroxyalkyl radical, a nitro radical, a cyano radical, a C_1-C_6 cyanoalkyl radical, a C_1-C_6 alkoxy radical, a C_1-C_6 tri(C_1-C_6 alkyl)silanealkyl radical, an amido radical, an aldehydo radical, a carboxyl radical, a C_1-C_6 ketoalkyl radical, a thio radical, a C_1-C_6 thioalkyl radical, a (C_1-C_6 alkyl)thio radical, an amino radical, or an amino radical protected by a (C_1-C_6 alkyl)carbonyl, carbamyl or (C_1-C_6 alkyl)sulphonyl radical;

one of the radicals R_8, R_9 and R_{10} may also represent a second group Z, identical to or different from the first group Z;

- R_{11} represents a C_1-C_6 alkyl radical; a C_1-C_6 monohydroxyalkyl radical; a C_2-C_6 polyhydroxyalkyl radical; an aryl radical; a benzyl radical; a C_1-C_6 aminoalkyl radical, a C_1-C_6 aminoalkyl radical whose amine is protected by a (C_1-C_6 alkyl)carbonyl, carbamyl or (C_1-C_6 alkyl)sulphonyl radical; a C_1-C_6 carboxyalkyl radical; a C_1-C_6 cyanoalkyl radical; a C_1-C_6 carbamylalkyl radical; a C_1-C_6 trifluoroalkyl

radical; a C_1-C_6 tri(C_1-C_6 alkyl)silanealkyl radical; a C_1-C_6 sulphonamidoalkyl radical; a C_1-C_6 (C_1-C_6 alkyl)carboxyalkyl radical; a C_1-C_6 (C_1-C_6 alkyl)-sulphinylalkyl radical; a C_1-C_6 (C_1-C_6 alkyl)sulphonyl-alkyl radical; a C_1-C_6 (C_1-C_6 alkyl)ketoalkyl radical; a C_1-C_6 N-(C_1-C_6 alkyl)carbamylalkyl radical; a C_1-C_6 N-(C_1-C_6 alkyl)sulphonamidoalkyl radical;

- a and y are integers equal to 0 or 1; with the following conditions:

- in the unsaturated cationic groups of formula (II):
  - when a = 0, the linker D is attached to the nitrogen atom,
  - when a = 1, the linker D is attached to one of the ring members E, G, J or L,
  - y can adopt the value 1 only
    1) when the ring members E, G, J and L simultaneously represent a carbon atom and when the radical R_7 is carried by the nitrogen atom of the unsaturated ring; or else
    2) when at least one of the ring members E, G, J and L represents a nitrogen atom to which the radical R_7 is attached;
- in the unsaturated cationic groups of formula (III):
  - when a = 0, the linker D is attached to the nitrogen atom,
  - when a = 1, the linker D is attached to one of the ring members E, G, J, L or M,

- y can adopt the value 1 only when at least one of the ring members E, G, J, L and M represents a divalent atom and when the radical R_7 is carried by the nitrogen atom of the unsaturated ring;

- in the cationic groups of formula (IV):
  - when a = 0, then the linker D is attached to the nitrogen atom which carries the radicals R_8 to R_{10},
  - when a = 1, then two of the radicals R_8 to R_{10}, together with the nitrogen atom to which they are attached, form a 5- or 6-membered saturated ring as defined above, and the linker D is carried by a carbon atom of the said saturated ring;

- X^- represents a monovalent or divalent anion;

with the proviso that the number of cationic groups Z is at least 1.

2. Compounds according to Claim 1, characterized in that the rings of the unsaturated groups Z of formula (II) are selected from pyrrole, imidazole, pyrazole, oxazole, thiazole and triazole rings.

3. Compounds according to Claim 1, characterized in that the rings of the unsaturated groups Z of formula (III) are selected from pyridine, pyrimidine, pyrazine, oxazine and triazine rings.

4. Compounds according to any one of the preceding claims, characterized in that two of the radicals R_8, R_9 and R_{10} form a pyrrolidine ring, a piperidine ring, a piperazine ring or a morpholine ring.

5. Compounds according to any one of the preceding claims, characterized in that X^- represents a halogen atom, a hydroxide, a hydrogen sulphate or a C_1-C_6 alkyl sulphate.

6. Compounds according to any one of the preceding claims, characterized in that they are selected from:

- 3-[3-(3-amino-5-methylpyrazolo[1,5-a]pyrimidin-7-ylamino)propyl]-1-(2-hydroxyethyl)-3H-imidazol-1-ium chloride,
- 3-[(3-aminopyrazolo[1,5-a]pyrimidin-7-ylcarbamoyl)-methyl]-1-methyl-3H-imidazol-1-ium chloride,
- 3-(3-amino-7-hydroxy-5-methylpyrazolo[1,5-a]-pyrimidin-6-ylmethyl)-1-methylpyridinium methyl sulphate,
- 3-(3-amino-7-hydroxy-5-methylpyrazolo[1,5-a]-pyrimidin-6-ylmethyl)-1-(2-hydroxyethyl)pyridinium chloride,
- 2-[(3-aminopyrazolo[1,5-a]pyrimidin-7-ylamino)methyl]-1,3-dimethyl-3H-imidazol-1-ium methyl sulphate,
- 3-[(3-aminopyrazolo[1,5-a]pyrimidin-7-ylamino)-methyl]-1-methylpyridinium methyl sulphate,

- 3-[(3-aminopyrazolo[1,5-a]pyrimidin-7-ylamino)-methyl]-1-methylpyridinium methyl sulphate,
- 2-(3,7-diamino-5-methylpyrazolo[1,5-a]pyrimidin-6-ylmethyl)-1,3-dimethyl-3H-imidazol-1-ium methyl sulphate,
- 2-(3-amino-7-hydroxy-5-methylpyrazolo[1,5-a]-pyrimidin-6-ylmethyl)-1,3-dimethyl-3H-imidazol-1-ium methyl sulphate,
- 2-(3,7-diaminopyrazolo[1,5-a]pyrimidin-2-yl)-1-methylpyridinium methyl sulphate,
- [3-(3-amino-5-methylpyrazolo[1,5-a]pyrimidin-7-ylamino)propyl]trimethylammonium chloride,
- [3-(3-amino-5-methylpyrazolo[1,5-a]pyrimidin-7-ylamino)propyl]trimethylammonium methyl sulphate,
- 1-[3-(3-amino-5-methylpyrazolo[1,5-a]pyrimidin-7-ylamino)propyl]-1-methylpiperidinium chloride,
- 1-[3-(3-amino-5-methylpyrazolo[1,5-a]pyrimidin-7-ylamino)propyl]-1-methylpiperidinium methyl sulphate,
- 4-[3-(3-amino-5-methylpyrazolo[1,5-a]pyrimidin-7-ylamino)propyl]-4-methylmorpholin-4-ium chloride,
- 4-[3-(3-amino-5-methylpyrazolo[1,5-a]pyrimidin-7-ylamino)propyl]-4-methylmorpholin-4-ium methyl sulphate,

and their addition salts with an acid.

7. Compounds according to Claim 6, characterized in that they are selected from:

- 3-[3-(3-amino-5-methylpyrazolo[1,5-a]pyrimidin-7-ylamino)propyl]-1-(2-hydroxyethyl)-3H-imidazol-1-ium chloride,
- 3-(3-amino-7-hydroxy-5-methylpyrazolo[1,5-a]-pyrimidin-6-ylmethyl)-1-methylpyridinium methyl sulphate,
- 3-(3-amino-7-hydroxy-5-methylpyrazolo[1,5-a]-pyrimidin-6-ylmethyl)-1-(2-hydroxyethyl)pyridinium chloride,
- 3-(3-amino-7-hydroxy-5-methylpyrazolo[1,5-a]-pyrimidin-6-ylmethyl)-1-methylpyridinium chloride,
- 4-[3-(3-amino-5-methylpyrazolo[1,5-a]pyrimidin-7-ylamino)propyl]-4-methylmorpholin-4-ium chloride,
- 4-[3-(3-amino-5-methylpyrazolo[1,5-a]pyrimidin-7-ylamino)propyl]-4-methylmorpholin-4-ium methyl sulphate,

and their addition salts with an acid.

8. Compounds according to any one of the preceding claims, characterized in that the addition salts with an acid are selected from the hydrochlorides, hydrobromides, sulphates, citrates, succinates, tartrates, lactates and acetates.

9. Use of the compounds of formula (I) as defined in any one of the preceding claims as oxidation base precursors for the oxidation dyeing of keratinous fibres.

10. Composition for the oxidation dyeing of keratinous fibres, characterized in that it comprises,

as oxidation base, in a medium appropriate for dyeing, at least one compound of formula (I) as defined in any one of Claims 1 to 8.

11. Composition according to Claim 10, characterized in that the compound or compounds of formula (I) represent(s) from 0.0005 to 12% by weight of the total weight of the dyeing composition.

12. Composition according to Claim 11, characterized in that the compound or compounds of formula (I) represent(s) from 0.005 to 6% by weight of the total weight of the dyeing composition.

13. Composition according to any one of Claims 10 to 12, characterized in that it includes at least one additional oxidation base selected from para-phenylenediamines, bisphenylalkylenediamines, para-aminophenols, ortho-aminophenols and heterocyclic bases other than the compounds of formula (I).

14. Composition according to Claim 13, characterized in that the additional oxidation base or bases represent(s) from 0.0005 to 12% by weight of the total weight of the dyeing composition.

15. Composition according to any one of Claims 10 to 14, characterized in that it includes at least one coupler and/or at least one direct dye.

16. Composition according to Claim 15, characterized in that the coupler or couplers is or are selected from meta-phenylenediamines, meta-

aminophenols, meta-diphenols and heterocyclic couplers, and their addition salts with an acid.

17. Composition according to Claim 16, characterized in that the coupler or couplers is or are selected from 2-methyl-5-aminophenol, 5-N-(β-hydroxyethyl)amino-2-methylphenol, 3-aminophenol, 1,3-dihydroxybenzene, 1,3-dihydroxy-2-methylbenzene, 4-chloro-1,3-dihydroxybenzene, 2,4-diamino-1-(β-hydroxyethyloxy)benzene, 2-amino-4-(β-hydroxyethylamino)-1-methoxybenzene, 1,3-diaminobenzene, 1,3-bis(2,4-diaminophenoxy)propane, sesamol, α-naphthol, 6-hydroxyindole, 4-hydroxyindole, 4-hydroxy-N-methylindole, 6-hydroxyindoline, 2,6-dihydroxy-4-methylpyridine, 1H-3-methylpyrazol-5-one, 1-phenyl-3-methylpyrazol-5-one, and their addition salts with an acid.

18. Composition according to any one of Claims 15 to 17, characterized in that the coupler or couplers represent(s) from 0.0001 to 10% by weight, approximately, of the total weight of the dyeing composition.

19. Composition according to any one of Claims 10 to 18, characterized in that the addition salts with an acid are selected from the hydrochlorides, hydrobromides, sulphates, citrates, succinates, tartrates, lactates and acetates.

20. Method of dyeing keratinous fibres and, in particular, human keratinous fibres such as the

hair, characterized in that at least one dyeing composition as defined in any one of Claims 10 to 19 is applied to the fibres, and in that the colour is revealed at an acidic, neutral or alkaline pH with the aid of an oxidizing agent which is added to the dyeing composition right at the time of use or which is present in an oxidizing composition which is applied simultaneously or sequentially, separately.

21. Method according to Claim 20, characterized in that the oxidizing agent is selected from hydrogen peroxide, urea peroxide, alkali metal bromates, persalts and enzymes.

22. Multi-compartment device or multi-compartment dyeing kit of which a first compartment contains a dyeing composition as defined in any one of Claims 10 to 19 and a second compartment contains an oxidizing composition.